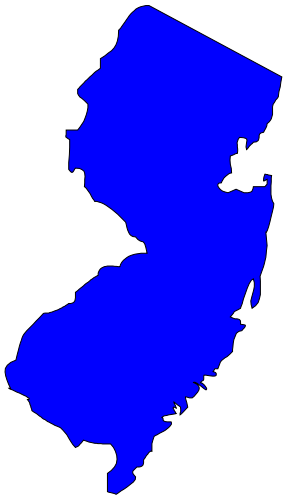
F.A.C.E.
INVESTIGATION REPORT

Fatality Assessment and Control Evaluation Project

FACE #95-NJ-070-01
High School Maintenance Worker Electrocuted
After Contacting a 277 Volt Electrical Cable



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FROM: Fatality Assessment and Control Evaluation (FACE) Project
New Jersey Department of Health (NJDOH)

SUBJECT: Face Investigation #95-NJ-070-01
High School Maintenance Worker Electrocuted After Contacting a
277 Volt Electrical Cable

DATE: November 20, 1995

SUMMARY

On July 7, 1995, a 28-year-old male maintenance worker was electrocuted while working in a public school building. The incident occurred in the office area of a high school during the alteration of a wall for the construction of an alcove for a copying machine. The victim had just started the project and had removed a section of sheetrock when he discovered an electrical cable behind the wall leading from a light switch to the overhead fluorescent lights. He notified his supervisor who looked over the problem and instructed him to disconnect the power at the breaker box and to wait until he got back before he proceeded. After the supervisor left, the victim dismantled the light switch box and pulled the cable out of the wall. The victim was apparently stripping the wires on the cable when he contacted 277 volts, electrocuting him. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, these safety guidelines should be followed:

o Employers should develop, implement, and enforce an electrical lock-out, tag-out procedure.

o Employers and employees should ensure that all electrical circuits are de-energized and tested before working on them.

o Employers should be aware of educational and training resources for health and safety information.

INTRODUCTION

On July 10, 1995, NJDOH FACE personnel were informed by a newspaper article of a work-related electrocution at a public high school. On July 18, 1995, FACE investigators conducted a site visit to interview the employers' representative and victim's supervisor. After viewing and photographing the scene, FACE investigators also briefly met with the investigating police detective to view the police photos and electrical cable that had been preserved as evidence. Additional information on the incident was obtained from the NJ Department of Labor Public Employees OSHA, the school's internal investigation report, and the police and medical examiner's reports.

The employer was a public high school under the jurisdiction of the regional board of education. The board of education had been in existence since 1955, with the high school opening in 1960, and employed 160 unionized workers at the time of the incident. Except for on-the-job training, the board of education did not have a specific job or safety training program for the maintenance department.

The victim was a 28-year-old maintenance worker who had been working for the school for about three weeks. He had previous experience in maintaining cryogenic liquid systems and had been a helicopter mechanic in the army. Although he had experience in servicing alarm systems, his resume did not indicate any formal electrical training.

INVESTIGATION

The incident occurred indoors at a large suburban public high school. The school had recently completed its graduation ceremonies and was out for the summer, allowing time for maintenance projects. One project was to build an alcove for the photocopy machine in one of the administrative offices. This required removing a section of sheetrock and the supporting wood studs from an office wall to construct the alcove. The victim, who had only worked for the school for a few weeks, had previously been involved with doing minor maintenance repairs under the supervision of the building and grounds foreman. Except for replacing some outlet strips, he had not been involved in doing any electrical work.

On the day of the incident, a Friday, the victim arrived for work at his usual time of 7:00 a.m. He went to work on a "hot list" of small chores, such as repairing pencil sharpeners. At about 9:00 a.m., he met with his supervisor to discuss building the photocopier alcove. He was instructed to neatly cut away the sheet rock from one side of the wall in the 12 by 12 foot office, and was left alone to do his work. The victim cut away a five by six foot area of sheetrock, exposing a BX

metal-shielded electrical cable that ran horizontally through the wooden studs. The cable led from a light switch into the wall and was part of a 277 volt system for the overhead florescent lights. The victim informed his supervisor, and the two traced the cable to a junction box above the ceiling tiles. At this time, a third person (a former school maintenance person who now worked for another school) entered and the three men discussed the problem. They concluded that the cable would need to be removed and rewired away from the alcove. The plan was to pull the cable from the wall, cap the wires, and have a contractor do the rewiring. The supervisor told the victim to turn the power off in the closet (where the breaker box was), and to wait until he got back before doing anymore. He then left the room to help the former employee get some tiles.

Once again alone in the room, the victim apparently decided to go ahead with the project on his own. He first pulled the cable out of the wall switch box, shutting off the lights. He continued work by using a penlight in his mouth. A nearby secretary noticed a flash and popping sound and asked if the victim was OK, to which he smiled and said "Yes". Concerned, the secretary started to go to the school business administrator to inform him of what was going on. The victim went back to work, holding the shielded cable in his hand and using a wire stripper to remove the insulation from the wire ends. He successfully stripped one wire and was cutting through the second when he contacted the energized 277 volt conductor. At this time, another school worker heard a second popping sound and saw the victim holding the wire to his chest as he collapsed to the floor. She shouted for help and was assisted by several other workers, one of whom kicked the live wire clear of the victim. They started cardio-pulmonary resuscitation until the police, first aid squad, and paramedics arrived. The victim was transported to the local hospital where he was pronounced dead at 12:37 p.m.

The police report stated that the first pop and flash occurred when the cable contacted the metal box as it was pulled from the light switch, charring the knockout hole. The victim then contacted the electric power through the pliers, which were melted onto the wire, and was grounded through the shielded cable. The police speculated that the victim may have been stripping the wires to connect them together in order to turn the room lights back on.

CAUSE OF DEATH

The county medical examiner attributed the cause of death to electrocution. Burns were noted on the victim's hands and chest.

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Employers should develop, implement, and enforce an electrical lock-out, tag-out procedure.

Discussion: In this situation, the employer did not have a lock-out, tag-out program. It is recommended that the employer implement an effective electrical lock-out, tag-out procedure that includes de-energizing and locking out all circuits at the breaker box. All employees should receive lock-out, tag-out training and one employee should be responsible for locking out and testing the circuits. The locking out and tagging of electrical controls is required by the OSHA standard 29 CFR 1910.333 and the NJ Public Employees OSHA standard N.J.A.C. 12:100-11.

Recommendation #2: Employers and employees should ensure that all electrical circuits are de-energized and tested before working on them.

Discussion: It is not known why the victim chose to work on the energized wires after being instructed by his supervisor not to do so. To prevent future incidents, it is imperative that employers and employees de-energize all circuits that they may potentially contact. All circuits should be tested to verify that they are de-energized. It may be useful to do this with a voltage detector (such as a tic-tracer) which senses a circuit's electric field without making direct contact with the wires.

Recommendation #3: Employers should be aware of educational and training resources for health and safety information.

Discussion: It is important that employers obtain correct information about OSHA regulations and methods of ensuring safe working conditions. Because it is often difficult for a small business to obtain this type of information, the following sources may be helpful:

NJ Department of Labor, Public Employees OSHA & U.S. Department of Labor, OSHA:
On request, NJ-PEOSHA and Federal OSHA will provide information on safety standards and requirements. PEOSHA can be contacted at the NJDOL Division of Workplace Standards, CN 386, Trenton NJ 08625, telephone (609) 292-7036. Federal OSHA has several offices in New Jersey which cover the following areas:

Hunterdon, Union, Middlesex, Warren and Somerset Counties....(908) 750-3270
Essex, Sussex, Hudson and Morris Counties.....(201) 263-1003

Bergen and Passaic Counties.....(201) 288-1700
Atlantic, Gloucester, Burlington, Mercer, Camden, Monmouth,
Cape May, Ocean, Cumberland and Salem Counties.....(609) 757-5181

NJDOL OSHA Consultative Services : The New Jersey Department of Labor OSHA Consultative Service will provide free consultation to business owners on improving health and safety in the workplace and complying to OSHA standards. Their telephone number is (609) 292-3922.

New Jersey State Safety Council : The NJ Safety Council provides a variety of courses on work-related safety. There is a charge for the seminars. Their address and telephone number is 6 Commerce Drive, Cranford, New Jersey 07016, telephone (908) 272-7712

Other Sources : Trade organizations and labor unions are a good source of information on suppliers of safety equipment and training.

REFERENCES

Code of Federal Regulations 29 CFR 1926, 1991 edition. U.S. Government Printing Office, Office of the Federal Register, Washington DC.

"Control of Hazardous Energy (Lockout/Tagout)" US Department of Labor, OSHA Publication #3120, OSHA Publications Office, 200 Constitution Ave. N.W., Washington, D.C. 20210.

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